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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
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ART UNIT	PAPER NUMBER
1773	

10

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)	
	09/846,889	FEIST ET AL.	
	Examiner	Art Unit	
	Kevin M Bernatz	1773	

C1C

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on ______ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-60 is/are pending in the application.

4a) Of the above claim(s) ______ is/are withdrawn from consideration.

5)☐ Claim(s) ______ is/are allowed.

6)☒ Claim(s) 1-60 is/are rejected.

7)☐ Claim(s) ______ is/are objected to.

8)☐ Claim(s) ______ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on ______ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on ______ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ______ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ______ .

4) ☐ Interview Summary (PTO-413) Paper No(s). ______ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other:

DETAILED ACTION

Response to Amendment

1. Amendments to claims 1, 5-8, 11-13, 18, 21 and 56 – 58, filed on December 16, 2003, have been entered in the above-identified application.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Request for Continued Examination

3. The Request for Continued Examination (RCE) under 37 CFR 1.53 (d) filed on December 16, 2003 is acceptable and a RCE has been established. An action on the RCE follows.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 11 – 13 and 18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. While the as-filed disclosure

teaches an edge-life for the substrate (*Paragraph 0034*), the as-filed disclosure does not teach or describe controlling just the edge-lift of the plastic resin portion to the claimed range limitations.

Claim Rejections - 35 USC § 103

6. Claims 1, 5 – 7 and 11 - 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Landin et al. (U.S. Patent No. 5,538,774) as evidenced by Sandstrom ('461), Quantegy article, Zou et al. ('015), Czubarrow ('681), Stanish et al. ('495), Hirata et al. ('017), Annacone et al. ('045), Yamaguchi ('489), Hartog et al. ('542 B1), Tenhover et al. ('403), Bonnebat et al. ('020), Mori et al. ('705 A1), Miyake et al. ('159), Kuromiya et al. ('989) and Oniki et al. ('083).

Regarding claims 1, 11 – 13, 16 – 18 and 24, Landin et al. disclose a method for retrieving data, comprising rotating a storage media (*col. 2, line 66 bridging col. 3, line 8*) comprising at least one plastic portion (*Figure 3, element 12a*) disposed between at least one data layer (*element 16a*) and a substrate (*element 14 and col. 9, lines 46 - 55*); directing an energy field at said storage media (*col. 1, lines 25 – 27*) such that said energy field is incident upon the data layer before it can be incident upon the substrate (*col. 2, line 63 bridging col. 3, line 8; see also Paragraph 4 above*); and retrieving information from the data layer via said energy field (*col. 1, lines 25 – 27 and col. 2, line 63 bridging col. 3, line 8*).

Regarding the limitations of "an edge-lift height" and "an axial displacement peak", it would have been obvious to one having ordinary skill in the art to have

minimized the results effective variables such as the "edge lift height" and "axial displacement peak" to values meeting applicants' claimed limitations through routine experimentation, especially given the knowledge in the art that low values of the edge lift and axial displacement peak are desired for increased areal recording density since they enable a larger surface area of the disk to be used and enable closer head-disk spacing, as evidenced by Sandstrom ('461), Quantegy article, Zou et al. ('015), Czubarrow ('681) and Stanish et al. ('495). *In re Boesch*, 205 USPQ 215 (CCPA 1980), *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Landin et al. fail to disclose a surface roughness meeting applicants' claimed limitations (i.e. less than 10 Å or less than 5 Å).

However, it would have been obvious to one having ordinary skill in the art to have minimized the results effective variable "surface roughness" to values meeting applicants' claimed limitations through routine experimentation, especially given the knowledge that extremely low (i.e. < 10 Å) surface roughness values are required for near-field high density recording media as evidenced by Hirata et al. ('017), Annacone et al. ('045), Yamaguchi ('489), Hartog et al. ('542 B1), Tenhover et al. ('403) and Bonnebat et al. ('020).

Regarding claims 5 - 7, the limitation(s) "an areal density capability of " is (an) intended use limitation(s) and is not further limiting in so far as the structure of the product is concerned. Note that "in apparatus, article, and composition claims, intended use must result in a ***structural difference*** between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. ***If the prior***

art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art." [emphasis added] *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); *In re Otto*, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963). See MPEP § 2111.02. In the instant case, the claimed areal recording density is a function of the track width, track density, type of magnetic layer, properties of the magnetic layer and the spatial location of the head relative to the medium, and is hence not a property solely of the media, per se, <u>as evidenced by Hartog et a. ('542), Tenhover et al. ('403) and Annacone et al. ('045)</u>.

Regarding claims 14, 15, 19 - 23, 25 – 29 and 56 - 59, these claims are directed to property limitations of the claimed medium that are not explicitly disclosed by the Landin et al. reference. However, in the instant case, the claimed and prior art products are substantially identical in structure <u>and</u> composition (i.e. a composite substrate formed from both rigid materials and plastic materials) (*col. 5, lines 58 – 64; col. 11, lines 1 – 5; and examples).*

Therefore, in addition to the above disclosed limitations, the presently claimed properties of:

- a mechanical damping coefficient greater than 0.04 and 0.06 at a temperature of 24 °C (claims 14, 15, 19, 20, 25 and 26);
- a moment of inertia of less than 5.5×10^{-3} slug-in^2, 4.5×10^{-3} slug-in^2 and 4.0×10^{-3} slug-in^2 (claims 21 - 23);

- a moisture content which varies less than 0.5% at the claimed test conditions (claim 27);
- a resonant frequency of greater than 250 Hz (claim 28);
- a specific gravity of less than 1.5 (claim 29);
- a first modal frequency greater than an operating frequency (claims 56 and 57);
- only one modal frequencies less than an operating frequency (claim 58); and
- a flexural modulus of greater than 250 kpsi (claim 59),

would appear to necessarily flow from the as-disclosed structure because the claimed and prior art products are substantially identical in both structure (composite + core substrates) and compositions (rigid and plastic portions).

Furthermore, even in the instance that the claimed property limitations would not have necessarily been present in every embodiment taught by Landin et al., it would have been obvious to one having ordinary skill in the art to have minimized the results effective variables moment of inertia (<u>as evidenced by Bonnebat et al. ('020) and the Quantegy article</u>), the flexural modulus (<u>as evidenced by Annacone et al. ('045), Bonnebat et al. ('020), Czubarow et al. ('681), and Kuromiya et al. ('989)</u>, the moisture content variability (<u>as evidenced by Czubarrow ('681), Bonnebat et al. ('020) and the Quantegy article</u>), the specific gravity (<u>as evidenced by Mori et al. ('705 A1), Stanish et al. ('495) and Bonnebat et al. ('020)</u>) and the number of modal frequencies less than an operating frequency of the substrate (<u>as evidenced by Miyake et al. ('159), Kuromiya et al. ('989), Oniki et al. ('083)</u>) , as well as increasing the mechanical damping coefficient

(as evidenced by Landin et al. ('774); Mori et al. ('705)), resonant frequency (as evidenced by Miyake et al. ('159), Kuromiya et al. ('989), Oniki et al. ('083)) and first modal frequency (as evidenced by Miyake et al. ('159), Kuromiya et al. ('989), Oniki et al. ('083)) to values meeting applicants' claimed limitations since one of ordinary skill in the art at the time of applicants' invention would recognize that controlling all of these properties to within applicants' claimed limitations are necessary, and desirable, inorder to achieve a dimensionally stable, high start-stop time recording media for high areal recording density applications.

Furthermore, regarding claim 57 above, the examiner notes that since all substrates necessarily possess a flexural modulus and a specific gravity, given the situation that the first modal frequency is outside of an operating frequency range, all substrates will necessarily meet applicants' claimed limitation (i.e. since no numerical values for the modulus or specific gravity are claimed in claim 57, if the first modal frequency is outside the operating frequency range then clearly whatever the value of the modulus and specific gravity, these values clearly are adequate to "place the first modal frequency outside of *an* operating frequency range".

Regarding claims 30 - 34, 37 and 38, Landin et al. disclose substrate/core/additive materials meeting applicants' claimed limitations (*col. 5, lines 58 – 64; col. 6, lines 1 – 2 and 42 – 67; and col. 7, lines 23 - 67*).

Regarding claims 51 and 52, the limitation "preformed cores" and "formed in situ with said substrate" are process limitations and are not further limiting in so far as the structure of the product is concerned. In the instant case, the final product is deemed to

be the same whether the damping material (i.e. "core") was formed along with the rest of the substrate or if the damping material was preformed and then made into the substrate.

Regarding claims 35 and 36, Landin et al. disclose said plastic resin portion having a thickness meeting applicants' claimed limitations (*col. 10, lines 24 – 28*). The exact thickness is a results effective variable based on the damping characteristics desired (*col. 5, lines 44 – 57*). It would have been obvious to one having ordinary skill in the art to have determined the optimum value of a results effective variable such as the plastic resin portion thickness through routine experimentation, especially given the teachings in Landin et al. regarding desired thickness values and the affect the amount of material used has on the damping characteristics.

Regarding claims 39, 42, 45 – 50 and 53 - 55, Landin et al. disclose substrates/cores/"inserts" meeting applicants' claimed limitations (i.e. solid or hollow cores having substantially constant thickness) (*Figures 2 – 4b, elements 8, 12a/12b, 32, 33, 35 and 52 – 54*).

Regarding claims 40, 41, 43 and 44, Landin et al. disclose cores having varied thickness (*Figure 4b, where the core varies from zero to non-zero across the width of the medium – elements 52 – 54*). Landin et al. further teach that the damping layer dimensions can be controlled depending on the area with the greatest vibrational stresses (*col. 5, lines 25 – 30*). The exact geometry of the core is therefore deemed an obvious matter of design choice to control where the most damping occurs (as well as controlling the moment of inertia and specific gravity of the substrate), since such a

modification of the core would have involved a mere change in the size of a component. A change in the size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955).

7. Claims 2, 8 – 10 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Landin et al. as applied above, and further in view of Hirata et al. (U.S. Patent No. 6,127,017).

Landin et al. is relied upon as described above.

Regarding claim 2, Landin et al. fail to disclose a method of reproducing where at least a portion of the energy field passes through the data layer and is reflected back through the data layer (i.e. a "reflecting layer" located between the substrate and the data layer).

However, Hirata et al. disclose adding a reflecting layer between the substrate and the data layer, which would necessarily reflect at least a portion of the energy field back through the data layer, if an optical or magneto-optical disk is being produced (*col. 8, lines 37 – 41 and Figure 10*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Landin et al. to include a reflecting layer between the substrate and the data layer, thereby necessarily reflecting at least a portion of the energy field back through the data layer if an optical or magneto-optical disk is being produced.

Regarding claims 8 and 9, Hirata et al. teach adding surface features meeting applicants' claimed limitations to the substrate for landing zone texture, servo tracking or data patterns (*Figures 8A – 8C; col. 6, lines 5 – 26; and col. 14, lines 5 – 32*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Landin et al. to include surface features meeting applicants' claimed limitations as taught by Hirata et al. inorder to provide landing zone texture, servo tacking or data patterns.

Regarding claim 10, the percent replication is deemed a results effective variable in terms of reproducibility and running quality. It would have been obvious to one having ordinary skill in the art to have maximized the value of a results effective variable such as the replication percent through routine experimentation, especially given the knowledge that the more reproducible the surface features are the better the servo tracking, data storage and running properties would be (i.e. if the surface features are for servo tracking and are not identical, the tracking would not always be accurate resulting in poor performance).

Regarding claim 60, Hirata et al. teach adding surface features meeting applicants' claimed limitations to the substrate for landing zone texture, servo tracking or data patterns (*Figures 8A – 8C; col. 6, lines 5 – 26; and col. 14, lines 5 – 32*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Landin et al. to include surface features meeting applicants' claimed limitations as taught by Hirata et al. inorder to provide landing zone texture, servo tacking or data patterns.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landin et al. as applied above, and further in view of Yamashita et al. ('457 B2).

Landin et al. is relied upon as described above.

Landin et al. fail to disclose rotating said storage media at a variable speed.

However, Yamashita et al. teach that it is known to rotate storage media at variable speed inorder to utilize a CLV (Constant Linear Velocity) system (*col. 1, lines 39 – 43*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Landin et al. to rotate the storage medium at a variable speed inorder to utilize a CLV system.

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Landin et al. as applied above, and further in view of Wu et al. (U.S. Patent No. 6,156,422).

Landin et al. is relied upon as described above.

Landin et al. fail to disclose the coercivity of the data storage layer.

However, Wu et al. teach that for high areal recording density, the "linear recording density can be increased by increasing the coercivity of the magnetic recording medium" (*col. 1, lines 23 – 33*) and further teaches coercivity values meeting applicants' claimed limitations as desired for high areal recording density recording media (*Figure 4A*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Landin et al. by increasing the coercivity of the data storage layer to values meeting applicants' claimed limitations as taught by Wu et al., since an increased coercivity results in an increased areal recording density.

10. Claims 1, 4 – 7, 11 – 31, 33 – 36, 39, 42, 45, 46, 48, 51 – 53 and 56 - 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang (U.S. Patent No. 6,433,964 B1) as evidenced by Sandstrom ('461), Quantegy article, Zou et al. ('015), Czubarrow ('681), Stanish et al. ('495), Hirata et al. ('017), Annacone et al. ('045), Yamaguchi ('489), Hartog et al. ('542 B1), Tenhover et al. ('403), Bonnebat et al. ('020), Mori et al. ('705 A1), Miyake et al. ('159), Kuromiya et al. ('989) and Oniki et al. ('083).

Regarding claims 1, 11 – 13, 16 – 18 and 24, Chang discloses a method for retrieving data, comprising rotating a storage media (*col. 3, lines 31 – 33*) comprising a substrate comprising at least one plastic portion (*Figures; col. 4, lines 23 – 57; and Example 1*), and at least one data layer disposed on at least one surface of said substrate (*col. 3, lines 54 – 60 and Example 1*), wherein said data layer can be at least partly read from, written to, or a combination thereof by at least one energy field; and wherein when the energy field contacts said data storage media, said energy field is incident upon said data layer before it could be incident upon said substrate (*in view of Figures and col. 4, lines 14 - 21 since the protective and lubricating layers are located between the magnetic layer and the side where the magnetic head would be; see also Paragraph 3, above*).

Regarding the limitations of “an edge-lift height” and “an axial displacement peak”, it would have been obvious to one having ordinary skill in the art to have minimized the results effective variables such as the “edge lift height” and “axial displacement peak” to values meeting applicants’ claimed limitations through routine experimentation, especially given the knowledge that low values of the edge lift and axial displacement peak are desired for increased areal recording density since they enable a larger surface area of the disk to be used and enable closer head-disk spacing, as evidenced by Sandstrom (‘461), Quantegy article, Zou et al. (‘015), Czubarrow (‘681) and Stanish et al. (‘495).

Chang fails to disclose a surface roughness meeting applicants’ claimed limitations (i.e. less than 10 Å or less than 5 Å).

However, it would have been obvious to one having ordinary skill in the art to have minimized the results effective variable “surface roughness” to values meeting applicants’ claimed limitations through routine experimentation, especially given the knowledge that extremely low (i.e. < 10 Å) surface roughness values are required for near-field high density recording media as evidenced by Hirata et al. (‘017), Annacone et al. (‘045), Yamaguchi (‘489), Hartog et al. (‘542 B1), Tenhover et al. (‘403) and Bonnebat et al. (‘020).

Regarding claims 5 - 7, the limitation(s) “an areal density capability of ” is (an) intended use limitation(s) and is not further limiting in so far as the structure of the product is concerned. In the instant case, the claimed areal recording density is a function of the track width, track density, type of magnetic layer, properties of the

magnetic layer and the spatial location of the head relative to the medium, and is hence not a property solely of the media, per se, as evidenced by Hartog et a. ('542), Tenhover et al. ('403) and Annacone et al. ('045).

Regarding claims 14, 15, 19 - 23, 25 – 29 and 56 - 59, these claims are directed to property limitations of the claimed medium that are not explicitly disclosed by the Chang reference. However, in the instant case, the claimed and prior art products are substantially identical in structure and composition (i.e. a composite substrate formed from both rigid materials and plastic materials) (*Figures; col. 4, lines 23 – 57 and Example 1).*

Therefore, in addition to the above disclosed limitations, the presently claimed properties of:

- a mechanical damping coefficient greater than 0.04 and 0.06 at a temperature of 24 °C (claims 14, 15, 19, 20, 25 and 26);
- a moment of inertia of less than 5.5×10^{-3} slug-in^2, 4.5×10^{-3} slug-in^2 and 4.0×10^{-3} slug-in^2 (claims 21 - 23);
- a moisture content which varies less than 0.5% at the claimed test conditions (claim 27);
- a resonant frequency of greater than 250 Hz (claim 28);
- a specific gravity of less than 1.5 (claim 29);
- a first modal frequency greater than an operating frequency (claims 56 and 57);
- only one modal frequencies less than an operating frequency (claim 58); and

- a flexural modulus of greater than 250 kpsi (claim 59),

would appear to necessarily flow from the as-disclosed structure because the claimed and prior art products are substantially identical in both structure (composite + core substrates) and compositions (rigid and plastic portions).

Furthermore, even in the instance that the claimed property limitations would not have necessarily been present in every embodiment taught by Chang, it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables moment of inertia (as evidenced by Bonnebat et al. ('020) and the Quantegy article), the flexural modulus (as evidenced by Annacone et al. ('045), Bonnebat et al. ('020), Czubarow et al. ('681), and Kuromiya et al. ('989), the moisture content variability (as evidenced by Czubarrow ('681), Bonnebat et al. ('020) and the Quantegy article), the specific gravity (as evidenced by Mori et al. ('705 A1), Stanish et al. ('495) and Bonnebat et al. ('020)) and the number of modal frequencies less than an operating frequency of the substrate (as evidenced by Miyake et al. ('159), Kuromiya et al. ('989), Oniki et al. ('083)) , as well as increasing the mechanical damping coefficient (as evidenced by Landin et al. ('774); Mori et al. ('705)), resonant frequency (as evidenced by Miyake et al. ('159), Kuromiya et al. ('989), Oniki et al. ('083)) and first modal frequency (as evidenced by Miyake et al. ('159), Kuromiya et al. ('989), Oniki et al. ('083)) to values meeting applicants' claimed limitations since one of ordinary skill in the art at the time of applicants' invention would recognize that controlling all of these properties to within applicants' claimed limitations are necessary, and desirable, inorder

to achieve a dimensionally stable, high start-stop time recording media for high areal recording density applications.

Regarding claim 4, Chang discloses coercivity values meeting applicants' claimed limitations (*col. 3, lines 54 – 57*).

Regarding claims 30, 31, 33 and 34, Chang discloses substrate and core materials meeting applicants' claimed limitations (*Figures and col. 4, lines 21 – 27 and lines 54 - 57*).

Regarding claims 35 and 36, Chang discloses overlapping thickness values (*col. 4, lines 46 – 53*). It would therefore have been obvious to one having ordinary skill in the art to have determined the optimum value of a results effective variable such as the plastic resin thickness through routine experimentation, since the plastic resin thickness effects the damping properties and the weight of the medium.

Regarding claims 39, 42, 45, 46, 48 and 53, Chang discloses cores/inserts/substrates (*Figures*) meeting applicants' claimed limitations (i.e. solid core/substrate having substantially constant thickness). The examiner notes that the core/insert (*Figures 3 and 4*) is a core/insert comprising at least one filled "ring-like" cavity (i.e. the entire layer is "filled").

Regarding claims 51 and 52, the limitation "preformed cores" and "formed in situ with said substrate" are process limitation and are not further limiting in so far as the structure of the product is concerned for the reasons cited above.

11. Claims 2, 8 - 10 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang as applied above, and further in view of Hirata et al. ('017).

Chang is relied upon as described above.

Regarding claim 2, Chang fails to disclose a method of reproducing where at least a portion of the energy field passes through the data layer and is reflected back through the data layer (i.e. a "reflecting layer" located between the substrate and the data layer), though Chang does disclose the substrate being capable of use for either magnetic or magneto-optic recording (*col. 2, lines 32 – 35*).

However, Hirata et al. disclose adding a reflecting layer between the substrate and the data layer, which would necessarily reflect at least a portion of the energy field back through the data layer, if an optical or magneto-optical disk is being produced (*col. 8, lines 37 – 41 and Figure 10*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Chang to include a reflecting layer between the substrate and the data layer, thereby necessarily reflecting at least a portion of the energy field back through the data layer if an optical or magneto-optical disk is being produced.

Regarding claims 8 and 9, Hirata et al. teach adding surface features meeting applicants' claimed limitations to the substrate for landing zone texture, servo tracking or data patterns (*Figures 8A – 8C; col. 6, lines 5 – 26; and col. 14, lines 5 – 32*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Chang to include surface features meeting

applicants' claimed limitations as taught by Hirata et al. inorder to provide landing zone texture, servo tacking or data patterns.

Regarding claim 10, the percent replication is deemed a results effective variable in terms of reproducibility and running quality. It would have been obvious to one having ordinary skill in the art to have maximized the value of a results effective variable such as the replication percent through routine experimentation, especially given the knowledge that the more reproducible the surface features are the better the servo tracking, data storage and running properties would be (i.e. if the surface features are for servo tracking and are not identical, the tracking would not always be accurate resulting in poor performance).

Regarding claim 60, Hirata et al. teach adding surface features meeting applicants' claimed limitations to the substrate for landing zone texture, servo tracking or data patterns (*Figures 8A – 8C; col. 6, lines 5 – 26; and col. 14, lines 5 – 32*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Chang to include surface features meeting applicants' claimed limitations as taught by Hirata et al. inorder to provide landing zone texture, servo tacking or data patterns.

12. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang as applied above, and further in view of Yamashita et al. ('457 B2).

Chang is relied upon as described above.

Chang fails to disclose rotating said storage media at a variable speed.

However, Yamashita et al. teach that it is known to rotate storage media at variable speed inorder to utilize a CLV (Constant Linear Velocity) system (*col. 1, lines 39 – 43*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Chang to rotate the storage medium at a variable speed inorder to utilize a CLV system.

13. Claims 32, 37, 38, 40, 41, 43, 44, 47, 49, 50, 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang as applied above, and further in view of Landin et al. ('774).

Chang is relied upon as described above.

Regarding claim 32, Chang fails to disclose plastic resins meeting applicants' claimed material limitations.

However, Landin et al. teach using plastics meeting applicants' claimed limitations as known substrate + core materials since they possess good damping properties (*col. 6, lines 1 – 2 and lines 42 – 67 – "acrylonitrile-butadiene-styrene block copolymers"*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Chang to use materials meeting applicants' claimed limitations as taught by Landin et al. since such materials are known substrate materials and possess good damping properties.

Regarding claims 37 and 38, Landin et al. teach adding fillers meeting applicants' claimed limitations inorder to strengthen the substrate and provide increased damping (*col. 7, lines 23 – 48 and lines 61 – 66; and col. 8, lines 61 – 63*).

Regarding claims 40, 41, 43 and 44, Landin et al. teach plastic cores of composite substrates having varied thickness and multiple portions (*Figure 4b, where the core varies from zero to non-zero across the width of the medium – elements 52 – 54*). Landin et al. further teach that the plastic core dimensions can be controlled depending on the area with the greatest vibrational stresses (*col. 5, lines 25 – 30*). The exact geometry of the core is therefore deemed an obvious matter of design choice to control where the most damping occurs (as well as controlling the moment of inertia and specific gravity of the substrate), since such a modification of the core would have involved a mere change in the size of a component. A change in the size is generally recognized as being within the level of ordinary skill in the art. It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Chang to include a core having varied thickness as taught by Landin et al. since varying the core dimensions can be used to optimize the damping, moment of inertia and specific gravity of the substrate, especially in the areas with the greatest vibrational stresses.

Regarding claims 47, 49, 50, 54 and 55, Landin et al. disclose adding cores/inserts comprising damping material, wherein the cores/inserts comprise multiple portions of different material, or are hollow (*Figure 4b*) and wherein the core/inserts are formed opposite the data layer (*Figures*). Landin et al. further teach that the amount

and location of these damping materials can be optimized to control the damping characteristics of the medium (*col. 5, lines 25 – 30 and 44 – 57; col. 9, line 26 bridging col. 10, line 15; col. 10, lines 34 – 47; and Figures*). It would therefore have been obvious to one having ordinary skill in the art to have determined the optimum value of a results effective variable such as the damping material locations and amounts through routine experimentation, especially given the teaching in Landin et al. above.

14. Claims 1, 5 – 7, 11 – 30, 32, 33 and 37 – 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otada et al. (JP 63-205817 A) in view of Landin et al. ('774) as evidenced by Sandstrom ('461), Quantegy article, Zou et al. ('015), Czubarrow ('681), Stanish et al. ('495), Hirata et al. ('017), Annacone et al. ('045), Yamaguchi ('489), Hartog et al. ('542 B1), Tenhover et al. ('403), Bonnebat et al. ('020), Mori et al. ('705 A1), Miyake et al. ('159), Kuromiya et al. ('989), Oniki et al. ('083), Kikuchi ('259), Oishi ('420), Zagar et al. ('009), Fujii et al. ('550) and Vedamuttu ('391). See provided Abstract Translation of JP '817 A.

Regarding claims 1, 11 – 13, 16 – 18 and 24, Otada et al. disclose a data storage media comprising a substrate comprising at least one plastic portion (*Abstract - "heat resistant plastic layer"*), and at least one data layer on said substrate (*Abstract "and magnetic layer"*), wherein said data layer can be at least partly read from, written to, or a combination thereof by at least one energy field; and wherein when the energy field contacts said data storage media, said energy field is incident upon said data layer before it could be incident upon said substrate (*in view of Figures and Abstract since the*

magnetic layer is deposited after the underlying layer and it is known in the art that the underlayers are located on the opposite side of the magnetic layer from the side where the magnetic head would be; see also Paragraph 3 above).

Regarding the limitations of "an edge-lift height" and "an axial displacement peak", it would have been obvious to one having ordinary skill in the art to have minimized the results effective variables such as the "edge lift height" and "axial displacement peak" to values meeting applicants' claimed limitations through routine experimentation, especially given the knowledge that low values of the edge lift and axial displacement peak are desired for increased areal recording density since they enable a larger surface area of the disk to be used and enable closer head-disk spacing, <u>as evidenced by Sandstrom ('461), Quantegy article, Zou et al. ('015), Czubarrow ('681) and Stanish et al. ('495)</u>.

Otada et al. fail to disclose a surface roughness meeting applicants' claimed limitations (i.e. less than 10 Å or less than 5 Å).

However, it would have been obvious to one having ordinary skill in the art to have minimized the results effective variable "surface roughness" to values meeting applicants' claimed limitations through routine experimentation, especially given the knowledge that extremely low (i.e. < 10 Å) surface roughness values are required for near-field high density recording media <u>as evidenced by Hirata et al. ('017), Annacone et al. ('045), Yamaguchi ('489), Hartog et al. ('542 B1), Tenhover et al. ('403) and Bonnebat et al. ('020)</u>.

Regarding claims 5 - 7, the limitation(s) "an areal density capability of " is (an) intended use limitation(s) and is not further limiting in so far as the structure of the product is concerned. In the instant case, the claimed areal recording density is a function of the track width, track density, type of magnetic layer, properties of the magnetic layer and the spatial location of the head relative to the medium, and is hence not a property solely of the media, per se, as evidenced by Hartog et a. ('542), Tenhover et al. ('403) and Annacone et al. ('045).

Regarding claims 14, 15, 19 - 23, 25 – 29 and 56 - 59, these claims are directed to property limitations of the claimed medium that are not explicitly disclosed by the Otada et al. reference. However, in the instant case, the claimed and prior art products are substantially identical in structure and composition (i.e. a composite substrate formed from both rigid materials and plastic materials) (*Abstract and Figures).*

Therefore, in addition to the above disclosed limitations, the presently claimed properties of:

- a mechanical damping coefficient greater than 0.04 and 0.06 at a temperature of 24 °C (claims 14, 15, 19, 20, 25 and 26);
- a moment of inertia of less than 5.5 x 10^{-3} slug-in^2, 4.5 x 10^{-3} slug-in^2 and 4.0 x 10^{-3} slug-in^2 (claims 21 - 23);
- a moisture content which varies less than 0.5% at the claimed test conditions (claim 27);
- a resonant frequency of greater than 250 Hz (claim 28);
- a specific gravity of less than 1.5 (claim 29);

- a first modal frequency greater than an operating frequency (claims 56 and 57);
- only one modal frequencies less than an operating frequency (claim 58); and
- a flexural modulus of greater than 250 kpsi (claim 59),

would appear to necessarily flow from the as-disclosed structure because the claimed and prior art products are substantially identical in both structure (composite + core substrates) and compositions (rigid and plastic portions).

Furthermore, even in the instance that the claimed property limitations would not have necessarily been present in every embodiment taught by Otada et al., it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables moment of inertia (as evidenced by Bonnebat et al. ('020) and the Quantegy article), the flexural modulus (as evidenced by Annacone et al. ('045), Bonnebat et al. ('020), Czubarow et al. ('681), and Kuromiya et al. ('989), the moisture content variability (as evidenced by Czubarrow ('681), Bonnebat et al. ('020) and the Quantegy article), the specific gravity (as evidenced by Mori et al. ('705 A1), Stanish et al. ('495) and Bonnebat et al. ('020)) and the number of modal frequencies less than an operating frequency of the substrate (as evidenced by Miyake et al. ('159), Kuromiya et al. ('989), Oniki et al. ('083)) , as well as increasing the mechanical damping coefficient (as evidenced by Landin et al. ('774); Mori et al. ('705)), resonant frequency (as evidenced by Miyake et al. ('159), Kuromiya et al. ('989), Oniki et al. ('083)) and first modal frequency (as evidenced by Miyake et al. ('159), Kuromiya et al. ('989), Oniki et al. ('083)) to values meeting applicants' claimed limitations since one of ordinary skill in

the art at the time of applicants' invention would recognize that controlling all of these properties to within applicants' claimed limitations are necessary, and desirable, inorder to achieve a dimensionally stable, high start-stop time recording media for high areal recording density applications.

Regarding claims 30, 39, 42, 45 and 48, Otada et al. disclose cores (*Figures 1, 2 and 4, element 1*) meeting applicants' claimed limitations (i.e. solid core having substantially constant thickness) (*Abstract*). The examiner notes that the ceramic substrate (*Figures 1, 2 and 4 - element 1*) is a core comprising at least one filled cavity (i.e. the entire layer is "filled").

Regarding claim 32, Landin et al. teach plastics meeting applicants' claimed limitations as known substrate + core materials since they possess good damping properties (*col. 6, lines 1 – 2 and lines 42 – 67 – "acrylonitrile-butadiene-styrene block copolymers"*). It would therefore have been obvious to use a plastic meeting applicants' claimed limitations since they are known substrate + core materials and they possess good damping properties.

Regarding claim 33, Otada et al. disclose plastics meeting applicants' claimed limitations (*Abstract – polyether imide*).

Regarding claims 37 and 38, Landin et al. teach adding fillers meeting applicants' claimed limitations to polymeric materials used in substrates inorder to strengthen the substrate and provide increased damping (*col. 7, lines 23 – 48 and lines 61 – 66; and col. 8, lines 61 – 63*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Otada et al. to include

fillers meeting applicants' claimed limitations in the resin portion of the substrate as taught by Landin et al. inorder to strengthen the substrate and provide increased damping.

Regarding claims 40, 41, 43, 44, 46, 47, 49 and 50, Otada et al. disclose cores of composite substrates having varied thickness and multiple portions (*Figure 3, where the core varies from zero to non-zero across the width of the medium and wherein the interior sections of element 1 would be filled by the heat resistant plastic layer, resulting in a "core" layer comprising both ceramic and plastic, the entire "core" coated by additional heat resistant plastic*). The exact geometry of the core is therefore deemed an obvious matter of design choice to control where the most damping occurs (as well as controlling the moment of inertia and specific gravity of the substrate), since such a modification of the core would have involved a mere change in the size of a component. A change in the size is generally recognized as being within the level of ordinary skill in the art. In addition, it is known to one of ordinary skill in the art that the material and dimensions of the core will effect the damping properties, as well as the moment of inertia and specific gravity of the substrate (see pertinent prior art cited below).

Regarding claims 51 and 52, the limitation "preformed cores" and "formed in situ with said substrate" are process limitation and are not further limiting in so far as the structure of the product is concerned for the reasons cited above.

Regarding claims 53 – 55, Landin et al. teach adding damping material to a ceramic substrate (*Figures and col. 5, lines 60 – 64*), wherein the damping materials can comprise hollow sections (*Figure 4b and col. 9, lines 62 – 63*) and can comprise

inserts formed opposite the data layer (*Figures*). Landin et al. further teach that the amount and location of these damping materials can be optimized to control the damping characteristics of the medium (*col. 5, lines 25 – 30 and 44 – 57; col. 9, line 26 bridging col. 10, line 15; col. 10, lines 34 – 47; and Figures*). It would therefore have been obvious to one having ordinary skill in the art to have determined the optimum value of a results effective variable such as the damping material locations and amounts through routine experimentation, especially given the teaching in Landin et al. above.

15. Claims 2, 8 – 10 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Otada et al. in view of Landin et al. as applied above, and further in view of Hirata et al. ('017).

Otada et al. and Landin et al. are relied upon as described above.

Regarding claim 2, neither Otada et al. nor Landin et al. disclose a method of reproducing where at least a portion of the energy field passes through the data layer and is reflected back through the data layer (i.e. a "reflecting layer" located between the substrate and the data layer).

However, Hirata et al. disclose adding a reflecting layer between the substrate and the data layer, which would necessarily reflect at least a portion of the energy field back through the data layer, if an optical or magneto-optical disk is being produced (*col. 8, lines 37 – 41 and Figure 10*). The examiner notes that Landin et al. disclose that substrates are analogous to optical, magnetic and magneto-optical recording (*col. 11, lines 12 – 20*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Otada et al. in view of Landin et al. to include a reflecting layer between the substrate and the data layer, thereby necessarily reflecting at least a portion of the energy field back through the data layer if an optical or magneto-optical disk is being produced.

Regarding claims 8 and 9, Hirata et al. teach adding surface features meeting applicants' claimed limitations to the substrate for landing zone texture, servo tracking or data patterns (*Figures 8A – 8C; col. 6, lines 5 – 26; and col. 14, lines 5 – 32*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Otada et al. in view of Landin et al. to include surface features meeting applicants' claimed limitations as taught by Hirata et al. inorder to provide landing zone texture, servo tacking or data patterns.

Regarding claim 10, the percent replication is deemed a results effective variable in terms of reproducibility and running quality. It would have been obvious to one having ordinary skill in the art to have maximized the value of a results effective variable such as the replication percent through routine experimentation, especially given the knowledge that the more reproducible the surface features are the better the servo tracking, data storage and running properties would be (i.e. if the surface features are for servo tracking and are not identical, the tracking would not always be accurate resulting in poor performance).

Regarding claim 60, Hirata et al. teach adding surface features meeting applicants' claimed limitations to the substrate for landing zone texture, servo tracking

or data patterns (*Figures 8A – 8C; col. 6, lines 5 – 26; and col. 14, lines 5 – 32*). It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Otada et al. in view of Landin et al. to include surface features meeting applicants' claimed limitations as taught by Hirata et al. inorder to provide landing zone texture, servo tacking or data patterns.

16. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Otada et al. in view of Landin et al. as applied above, and further in view of Yamashita et al. ('457 B2).

Otada et al. and Landin et al. are relied upon as described above.

Neither Otada et al. nor Landin et al. disclose rotating said storage media at a variable speed.

However, Yamashita et al. teach that it is known to rotate storage media at variable speed inorder to utilize a CLV (Constant Linear Velocity) system (*col. 1, lines 39 – 43*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Otada et al. in view of Landin et al. to rotate the storage medium at a variable speed inorder to utilize a CLV system.

17. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Otada et al. in view of Landin et al. as applied above, and further in view of Wu et al. ('422).

Otada et al. and Landin et al. are relied upon as described above.

Neither Otada et al. nor Landin et al. disclose the coercivity of the data storage layer.

However, Wu et al. teach that for high areal recording density, the "linear recording density can be increased by increasing the coercivity of the magnetic recording medium" (*col. 1, lines 23 – 33*) and further teaches coercivity values meeting applicants' claimed limitations as desired for high areal recording density recording media (*Figure 4A*).

It would therefore have been obvious to one having ordinary skill in the art to have modified the invention of Otada et al. in view of Landin et al. by increasing the coercivity of the data storage layer to values meeting applicants' claimed limitations as taught by Wu et al., since an increased coercivity results in an increased areal recording density.

Response to Arguments

18. The rejection of claims 1 - 60 under 35 U.S.C § 103(a) – Landin et al., alone or in view of various references

The rejection of claims 1 – 30, 32, 33 and 37 - 60 under 35 U.S.C § 103(a) – Otada et al., alone or in view of various references

The rejection of claims 1 - 60 under 35 U.S.C § 103(a) – Chang, alone or in view of various references

Applicants argue that improved properties are not results effective variables and that the claimed properties are not necessarily present in the cited prior art. The Examiner respectfully disagrees.

The Examiner notes that the prior art recognizes all of the claimed properties as known properties of recording media (as evidenced in the cited prior art of record). In addition, many teachings have been cited to ilustrate that the prior art recognized that certain ranges, minimums or maximums of the various properties are desired. It is this knowledge that (a) the property exists and (b) what values are desired that determines whether a variable is "results effective". Since the prior art teachings meet both (a) and (b) above, the Examiner deems that applicants are merely claiming optimizations of properties that are known in the art, specifically optimization to values that are recognized as preferred in the prior art. Applicants have presented no experimental evidence that the closest prior art (as exemplfied by the cited prior art of record) would be incapable of obtaining these properties nor whether the disclosed properties would not necessarily flow from the as-described structures. Comparison against non-cited art that is not deemed the "closest prior art" is not convincing. The Examiner notes that applicants' examples are directed to both solid non-core/coating substrates and composite substrates from known materials (e.g. examples 1 – 20), which would appear to indicate that known substrate materials are capable of achieving the claimed properties and that applicants' have merely claimed the optimization of these properties.

Regarding the evidentiary refernce Mori et al., the Examiner notes that MPEP 2124 explicitly states that "References which do not qualify as prior art because they post-

date the claimed invention may be relied upon to show the level of ordinary skill in the art at or around the time the invention was made". The Examiner notes that Mori et al. is relied upon in such a manner.

Applicants further argue that the areal recording density is solely a function of the media and conveys structural limitations. The Examiner respectfully disagrees.

The areal recording density, as stated by applicants on page 13 of the afterfinal response, "refers to the amount of data that can be stored in a given amount of hard disk platter "real estate"". This amount of data is strongly dependent on how the data is written, specifically the type of head used, the spacing of the head, etc, in addition to the magnetic characteristics of the magnetic layer. All this effects the size of the recording bits, which effects the bits/track, which effects the total bits (tracks/area), i.e. the "recording density".

19. The rejection of claims 1 - 60 under 35 U.S.C § 103(a) – JP '921, alone or in view of various references

The above noted rejection has been withdrawn because applicant(s) amendment(s) have set forth new limitations (e.g. "at least one plastic resin portion disposed between at least one data layer and a substrate") no longer anticipated, nor rendered obvious, by the above noted rejection.

Conclusion

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (571) 272-1516. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin M. Bernatz
Patent Examiner

February 4, 2004